Claims

What is claimed is:

1. An immunogenic composition comprising:

an effective amount of at least one recombinant flavivirus envelope protein subunit, wherein the envelope protein subunit is a portion of the envelope protein (E) that represents the portion of the envelope protein that constitutes 80% of its length starting from amino acid residue 1 at its N-terminus and which portion is a recombinantly produced protein from Drosophila cells recombinantly produced from Drosophila cells; and

an effective amount of an immunomodulating agent comprising saponin or saponin-like substance, an oligodeoxyribonucleotide, or a combination thereof, wherein the immunogenic composition induces the production of neutralizing antibodies and a cell-mediated immune response from a host provided with the immunogenic composition.

2. The immunogenic composition of claim 1, wherein the strain of the species of Flavivirus is selected from the group consisting of a strain of Dengue virus, a strain of Japanese encephalitis virus (JEV), a strain of Yellow Fever virus (YF), a strain of Tick-Borne Encephalitis virus (TBE), a strain of Saint Louis encephalitis virus (SLE), and a strain of West Nile virus (WN).

3. The immunogenic composition of claim 2, wherein the at least one envelope protein subunits comprises four envelope protein subunits derived from dengue virus serotypes 1, 2, 3, and 4.

4. The immunogenic composition of claim 1, wherein at least one recombinant flavivirus envelope protein subunits is a portion of the envelope protein (E) that represents the portion of the envelope protein that constitutes 80% of its length starting from amino acid residue 1 at its N-terminus to residue 395.

5. The immunogenic composition of claim 1, wherein the envelope protein subunit comprises six disulfide bridges at Cys1-Cys2, Cys3-Cys8, Cys4-Cys6, Cys5-Cys7, Cys9-Cys10 and Cys11-Cys12.

6. The immunogenic composition of claim 2, wherein at least one envelope protein subunit from dengue is a dimer.

7. The immunogenic composition of claim 6, wherein the dimer molecule is dimeric 80%E selected from the group consisting of: linked 80%E dimer; 80%E ZipperI; 80%E ZipperII; and 80%E Bundle.

8. The immunogenic composition of claim 7, wherein the dimeric 80%E is 80%E ZipperII.

9. The immunogenic composition of claim 8, wherein at least one dimeric envelope protein subunit is a dengue serotype 4 dimer.

10. The immunogenic composition of claim 7, wherein the leucine zipper peptide sequence further comprises a glycine-glycine-cysteine-glycine-glycine peptide at its carboxyl terminus.

11. The immunogenic composition of claim 1, further comprising at least one recombinant flavivirus non-structural protein.

12. The immunogenic composition of claim 11, wherein said recombinant *Flavivirus* non-structural protein is non-structural protein 1 (NS1).

13. The immunogenic composition of claim 12, wherein the NS1 is from dengue serotype 2.

14. The immunogenic composition of claim 13, wherein the NS1 is recombinantly produced and expressed in *Drosophila melanogaster* Schneider 2 (S2) cell lines, and is a secreted protein.

15. The immunogenic composition of claim 1, wherein said saponin is a purified derivative from *Quillaja saponaria* Molina bark.

16. The immunogenic composition of claim 15, wherein the purified derivative is selected from the group consisting of QS-7, QS-17, QS-18, and QS-21.

17. The immunogenic composition of claim 15, wherein said saponin is a water-soluble quillaic acid-based triterpene with an acylated 3,28-*O*-bisglycoside structure.

18. The immunogenic composition of claim 1, wherein said oligodeoxyribonucleotide comprises a sequence of nucleotides containing a CpG motif.

19. The immunogenic composition of claim 18, wherein said CpG motif is represented by the formula :

5' X_1 X_2 CG X_3 X_4 3'

wherein C and G are unmethylated, X_1, X_2, X_3 and X_4 are nucleotides and a GCG trinucleotide sequence is not present at or near the 5' and 3' termini.

20. The immunogenic composition of claim 18, wherein said CpG oligodeoxyribonucleotide is selected from the group consisting of TCCATGACGTTCCTGACGTT (CpG ODN 1826; SEQ ID NO: 1) and ATAATCGACGTTCAAGCAAG (CpG ODN 1760; SEQ ID NO: 2).

21. The immunogenic composition of claim 1, wherein said oligodeoxyribonucleotide is a non-CpG oligodeoxyribonucleotide.

22. The immunogenic composition of claim 21, wherein the non-CpG oligodeoxyribonucleotide is represented by the formula:

PyNTTTTGT

wherein Py is C or T, and N is A, T, C or G.

23. The immunogenic composition of claim 21, wherein the non-CpG oligodeoxyribonucleotide is selected from the group consisting of ATAATAGAGCTTCAAGCAAG (non–CpG ODN 1908; SEQ ID NO: 3) and TCCAATGAGCTTCCTGAGTCT (non–CpG ODN 1745; SEQ ID NO: 4).

24. The immunogenic composition of claim 1, wherein said oligodeoxyribonucleotide is GACGTT (hexamer CpG; SEQ ID NO: 5).

25. The immunogenic composition of claim 1, further comprising a pharmaceutically acceptable excipient.

26. A method for raising an immunogenic response from a host, comprising administering in a therapeutically acceptable manner a therapeutically effective amount of the immunogenic composition of claim 1 to said subject.